

Dishwasher with a door seal

The present invention relates to a dishwasher with a door seal.

5 When closed, a conventional dishwasher has a substantially rectangular washing container, one side of which can be opened and closed by means of a pivotable door. The four peripheral side areas must, when the dishwasher is closed, exhibit during the entire lifetime of the dishwasher a uniform sealing performance both with regard to spray water and also with regard to a certain excess pressure.

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Whereas the two vertical side areas and the horizontal upper side can be sealed by means of so-called sealing beading, which is disposed in corresponding joints in the washing container or the housing, the sealing of the underside located in the proximity of the horizontally disposed pivot axis conceals numerous problems, for example, as a result of the substantially  
 15 90-degree pivot angle, a relative movement takes place between the underside of the door (door apron) and the upper edge of the washing container (container lip). Furthermore, it is desirable to make assembly easy but dismantling should be more difficult. It is also desirable to take into account the aesthetic demands of the user, especially in high-quality consumer goods.

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It is thus the object of the present invention to provide a dishwasher with a seal between the door apron and the container lip, enabling a high sealing performance to be obtained during the entire service life of the dishwasher and providing an aesthetic appearance while the seal can be mounted reliably without any considerable expenditure of force, recycling is possible  
 25 as a result of the choice of material and said seal can withstand the dynamic strains of a door seal for a dishwasher.

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This object is achieved by the dishwasher according to the invention having a door seal with the features according to claim 1.

Advantageous further developments of the invention are characterised in the dependent claims 2 to 10.

The dishwasher with a door seal according to the invention comprises a door seal provided with a fixing area, a sealing element and a sealing strip, wherein the sealing area is connected to the sealing element via the sealing strip.

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[008] The door seal in the dishwasher is preferably made of an elastic plastic, especially thermoplastics and the fixing area is suitable for connection to the edge of the washing container and has a sealing function with respect to the washing container, and the sealing element is suitable for being arranged on an underside of the dishwasher door.

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[009] The fixing area, the sealing element and the sealing strip are preferably constructed in one piece. The door seal is thus particularly simple and cost-effective to produce and can produce a reliable seal.

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[010] The fixing area is preferably used to achieve the sealing effect on the edge of the washing container. Thus, no additional formations are required to achieve this sealing effect.

[011] In a further embodiment, the fixing area is formed from a hook-shaped or U-shaped section on the inside of which protruding resilient retaining elements are arranged.

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[012] In additional variant, the sealing element is formed from a frame-shaped hollow profile and is suitable for being fixed by means of fixing means in the area of the underside of the dishwasher.

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[013] The sealing strip is preferably constructed free of any reinforcing means made of different material.

[014] In a preferred embodiment at least one sealing lip is disposed on the frame-shaped hollow profile to seal between the sealing element and the dishwasher door.

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[015] Advantageously, recesses with corresponding ribs are arranged in the frame-shaped hollow profile of the sealing element on the outside to increase the rigidity of the sealing element in the longitudinal direction.

[016] In a further embodiment reinforcing ribs are arranged in the frame-shaped hollow profile on the inside.

[017] The door seal of the dishwasher according to the invention preferably consists of a thermoplastic material such as, for example, polypropylene and polyethylene and is produced by means of plastic injection moulding or extrusion. The manufacturing method can be made more efficient by the one-piece manufacture of the door seal according to the invention and thus contributes towards cost savings. The ribs integrated in the sealing strip during manufacture enable a predetermined rolling-up and unrolling of the sealing strip to be achieved when actuating, i.e., pivoting open the appliance door so that no kinks or bulges are formed which could have a negative influence on the good sealing performance. The sealing strip thus functions as a film hinge.

[018] When mounting the door seal of the dishwasher according to the invention, the fixing area is slid over the container lip. As a result of the pre-formed resilient retaining elements, this sliding movement can be achieved manually without any tools. However, as a result of the alignment of the resilient retaining elements, this fixing area can only be released with far greater forces since during a releasing movement, i.e. an attempted withdrawal of the fixing area from the container lip, the resilient retaining elements are compressed and apply a correspondingly high pressure to the contact area between the retaining element and container lip.

[019] The fixing area can only be completely released from the container lip after overcoming a certain resistance. It has proved to be particularly advantageous in this case that no lubricants are required for mounting and dismantling since as a result of the material pairing (surface structure pairing) of the container lip and the retaining elements, mounting can easily be accomplished whereas dismounting requires an increased expenditure of force.

[020] After mounting the fixing area on the container lip, the sealing strip provided with ribs extends in the direction of the washing container and at its other end has the frame-shaped hollow profile which is fixed by means of suitable fixing means for the underside of the door. For example, this type of fixing was effected by means of laterally protruding fixing lugs on the inside of the door.

[021] In a preferred embodiment of the door seal of the dishwasher according to the invention, a sealing lip spreads from the frame-shaped hollow profile and forms an apron-like cover between the frame-shaped hollow profile and the sealing strip. This apron-like cover can form an improved protection device towards the sealing strip, for example, in the event of falling knives or other items of cutlery. When the dishwasher door is closed, the sealing lip abuts against the dishwasher door over its entire length and thus forms the first sealing line with respect to the circulating washing solution in the washing container and the dishwasher door. Located after the sealing lip is the sealing strip which provides a further sealing function.

[022] Both the sealing lip mounted at the front and the sealing strip thus form a very effective sealing arrangement which prevents the circulating quantities of washing water from being able to flow behind the inside of the door or over the container lip.

[023] The present invention is explained in detail using a preferred embodiment with reference to the following drawings:

[024] Fig. 1 shows a cross-section through the door seal of the dishwasher according to the invention;

[025] Fig. 2 is an enlarged view of the fixing area 1 according to Fig. 1;

[026] Fig. 3 is a plan view of the door seal according to the invention;

[027] Fig. 4 is a perspective view of the door seal according to the invention.

[028] The left side of Fig. 1 shows the fixing area 1 of the door seal of the dishwasher according to the invention which has a plurality of retaining elements (here 4a-4f) in its interior which, as a result of their alignment, i.e., slightly inclined towards the inside of the fixing area 1, facilitate mounting on the one hand and on the other hand make dismounting  
5 difficult to carry out so that the door seal according to the invention cannot be removed in an uncontrolled manner (the dishwasher according to the invention is not shown).

[029] The non-hatched area of the fixing area 1 is preferably made of polypropylene and is especially preferably also thermally stabilised while the hatched area is also made of  
10 polypropylene but has not been thermally stabilised so that the elasticity is greater, this being more favourable for the sealing effect. The sealing function of the door seal according to the invention is substantially taken over by the areas shown hatched in Figs. 1 and 2, i.e., the retaining elements 4a to 4f, the sealing strip 2 and the sealing lip 5.

[030] The sealing strip 2 shown hatched also functions as a film hinge to allow reliable  
15 bending without buckling and bulging. When the door is closed, the sealing strip 2 is normally bent through about 180°, i.e. is arranged in a U-shape. As shown in Figs. 1 and 4, the sealing strip 2 is composed of two strips which are joined together by means of ribs. Cavities are thus formed between the two strips and the ribs. In a further preferred embodiment (not shown) the  
20 sealing strip 2 is formed without cavities but with recesses perpendicular to the plane of the drawing according to Fig. 1. These recesses (in longitudinal section in a view according to Fig. 1 which is not shown, areas of smaller thickness) act as additional hinges as a result of their smaller thickness so that the sealing strip 2 can be bent more easily.

[031] The sealing element 3 has recesses 6 on the outside with corresponding ribs. This  
25 structure is used to reinforce the sealing element 3. Reinforcing ribs 7 on the inside of the sealing element 3 are additionally used for reinforcement. The sealing element 3, for example, is only fixed at both ends on the lower side of the (inner) door of the dishwasher using pins which engage in the cavity of the sealing element 3. So that the sealing element 3 does not  
30 bend over the width of the inner door, the sealing element 3 must have sufficient rigidity in the longitudinal direction. The sealing strip 2 forms the connection between the fixing area 1 on the washing container and the sealing element 3 on the inner door of the dishwasher. The

sealing lip 5 is pressed against the inner door, thus producing a sealing effect at the dishwasher door.

[032] Figure 2 shows a detailed view of the fixing area 1 with the elastic retaining elements 4a to 4f. The choice of material for the non-hatched area is advantageously a thermally stabilised polypropylene, the hatched area is appropriately made of a non-thermally stabilised polypropylene which has higher elastic properties compared with the other region in order to additionally increase the sealing function.

[033] Figure 3 shows a plan view of the door seal of the dishwasher according to the invention with the areas, fixing area 1, sealing strip 2 and sealing area 3. Figure 4 shows a perspective view of the door seal according to the invention.

[034] Reference list

[035] 1 Fixing area

[036] 2 Sealing strip

[037] 3 Sealing element

[038] 4a-f Retaining element

[039] 5 Sealing lip

[040] 6 Recess

[041] 7 Reinforcing rib